

Name: _____

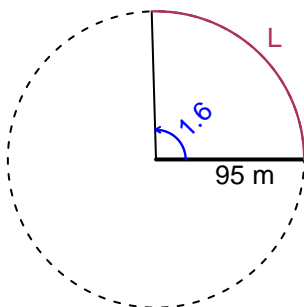
Date: _____

Trig Final (SLTN v678)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.6 radians. The radius is 95 meters. How long is the arc in meters?

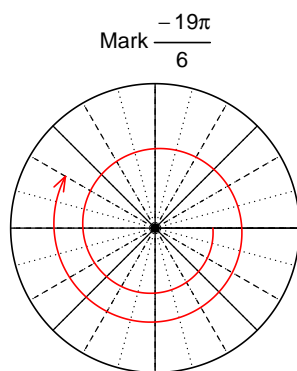


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 152$ meters.

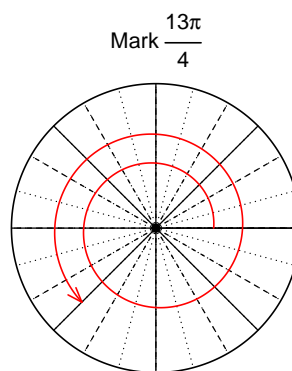
Question 2

Consider angles $-\frac{19\pi}{6}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(-\frac{19\pi}{6}\right)$ and $\cos\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(-19\pi/6)$

$$\sin(-19\pi/6) = \frac{1}{2}$$



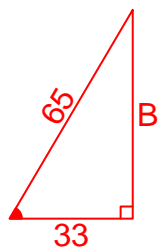
Find $\cos(13\pi/4)$

$$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$$

Question 3

If $\cos(\theta) = \frac{-33}{65}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

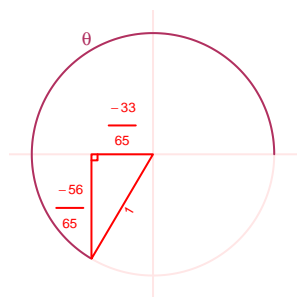
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}33^2 + B^2 &= 65^2 \\ B &= \sqrt{65^2 - 33^2} \\ B &= 56\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-56}{65}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 4.67 meters, a frequency of 2.68 Hz, and a midline at $y = -7.8$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.67 \cos(2\pi 2.68t) - 7.8$$

or

$$y = 4.67 \cos(5.36\pi t) - 7.8$$

or

$$y = 4.67 \cos(16.84t) - 7.8$$